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Nielsen, Thomas Alexander Sick

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How stable are urban form correlates of travel?

Analysis of urban form, location and transport behaviour in the Greater Copenhagen area 2006-2011.

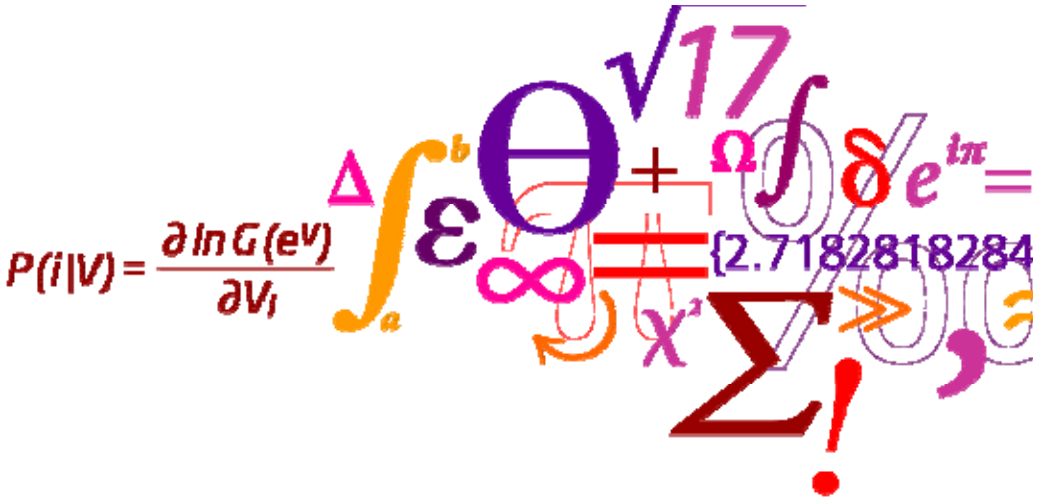
European Regional Science Association Congress 2012

21.08-25.08, Bratislava

Thomas A. Sick Nielsen

Email: thnie@transport.dtu.dk

Tel: +45 4525 6547



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Structure of the presentation

- Research questions
- Case study
- Data
- Methodology
- Results
- Conclusion

Research questions

- Few have looked at the stability of location determinants of transport and included other travel purposes than work.
- Changes in interactions and regional structure over time suggest time trends in the role of location and urban form. Furthermore location impacts may change as conditions for transport changes.
- The stability or trend in location and urban form impacts should be highly relevant to regional policy as well as to scenario development.

- **The main question asked is: How stable are urban form and location correlates of travel over time?**

- - and additionally: Are there differences in stability and changes over time when comparing total travel, work-related travel, and non-work travel?

A case study in two respects

1. The study focusses on **the island of Zealand**, Denmark on which Copenhagen and its surrounding suburban and peri-urban areas are located.

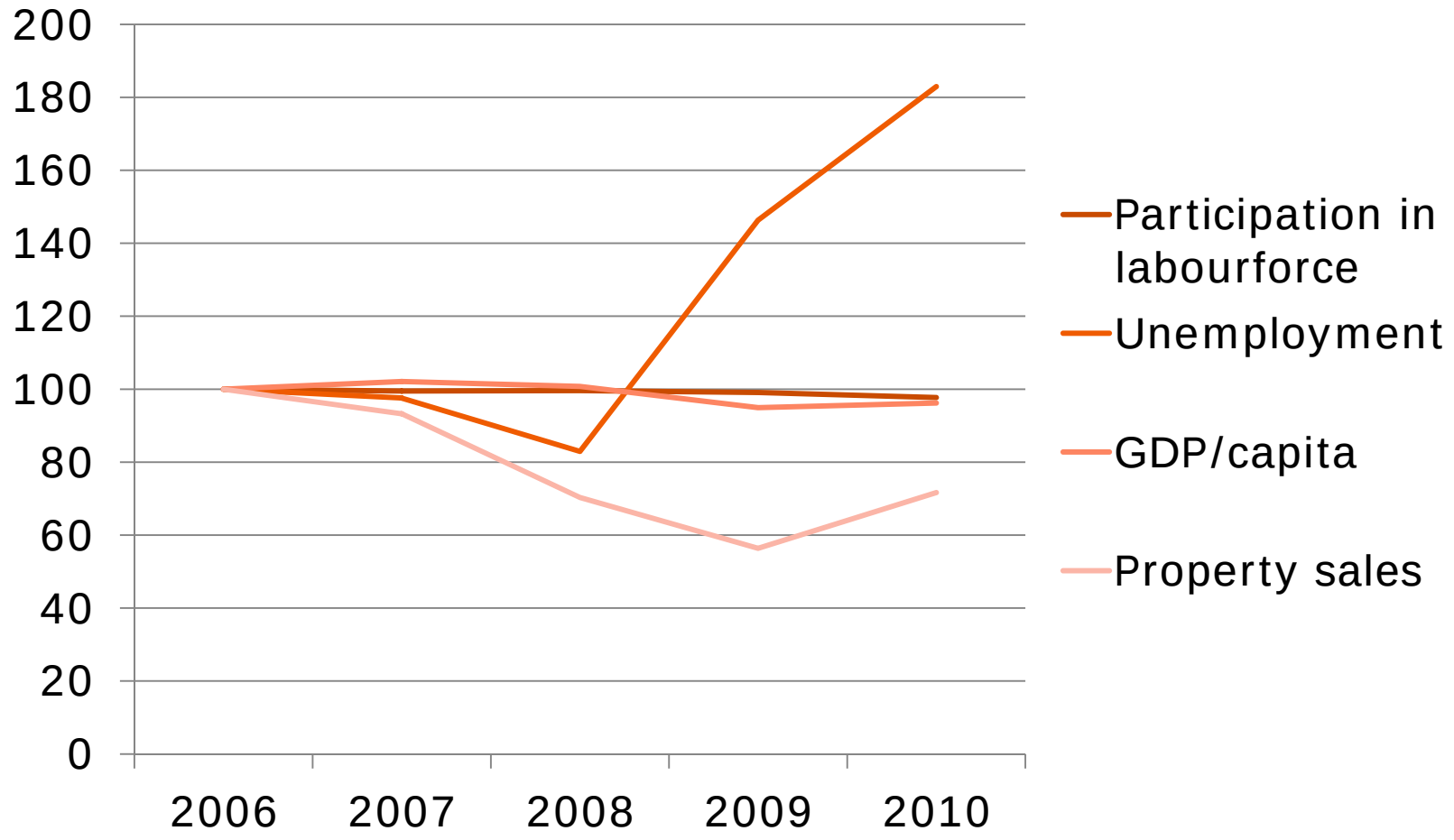
   The area population is 2,2 Mill. and growing approx 0,5% per year*. The main city is Copenhagen on which most of the urban areas of the region are centered.

2. The focus is on the **period from mid 2006 to mid 2011** from where consistent travel data are available, and in which the financial crisis changed the conditions for travel and activity patterns.

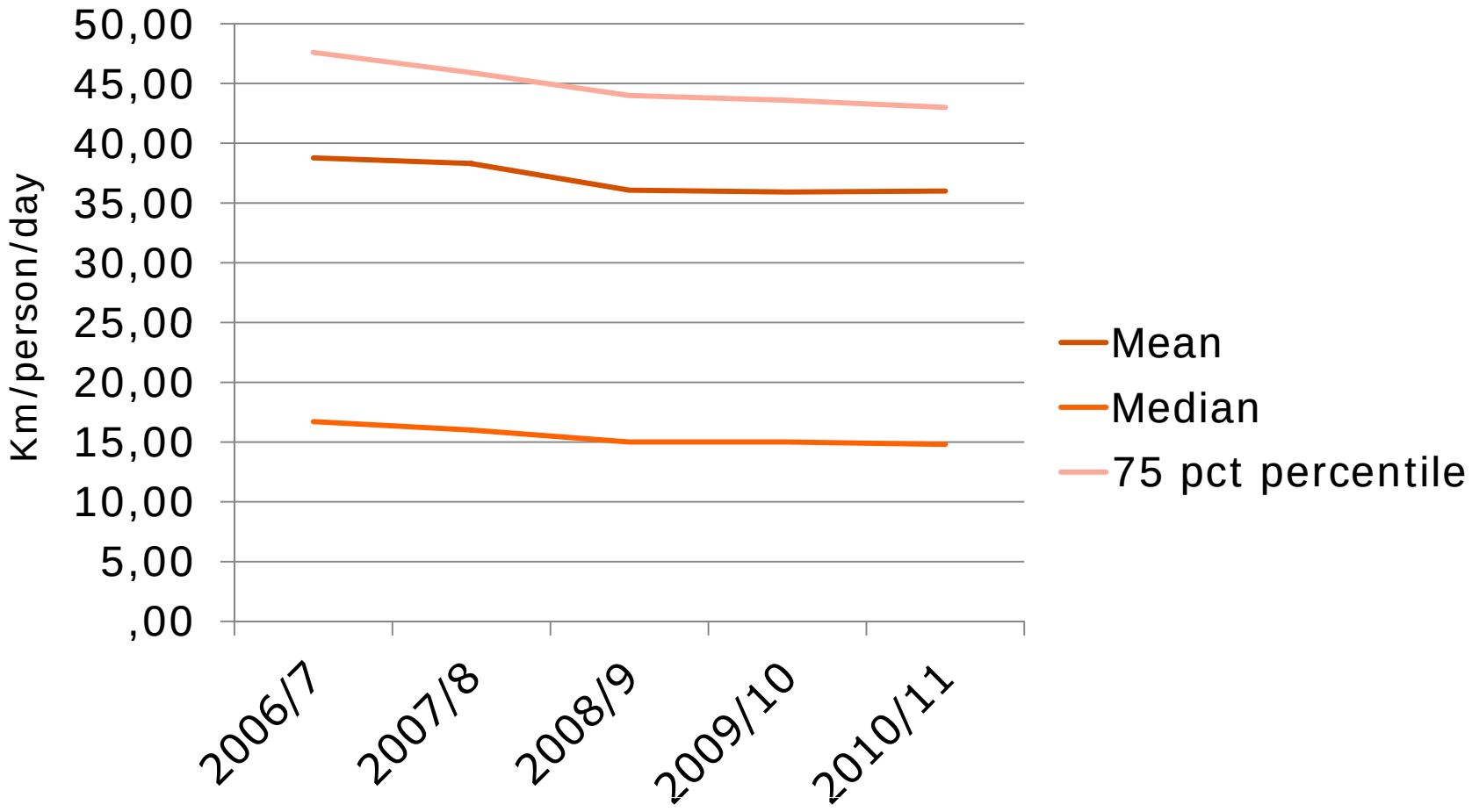
Map of Zealand from Google maps

* Average annual increase in population 2000 to 2012

Economic changes 2006-2010



Travel demand 2006-2010/11*



*Based on the Danish National Travel survey

Danish National Travel survey

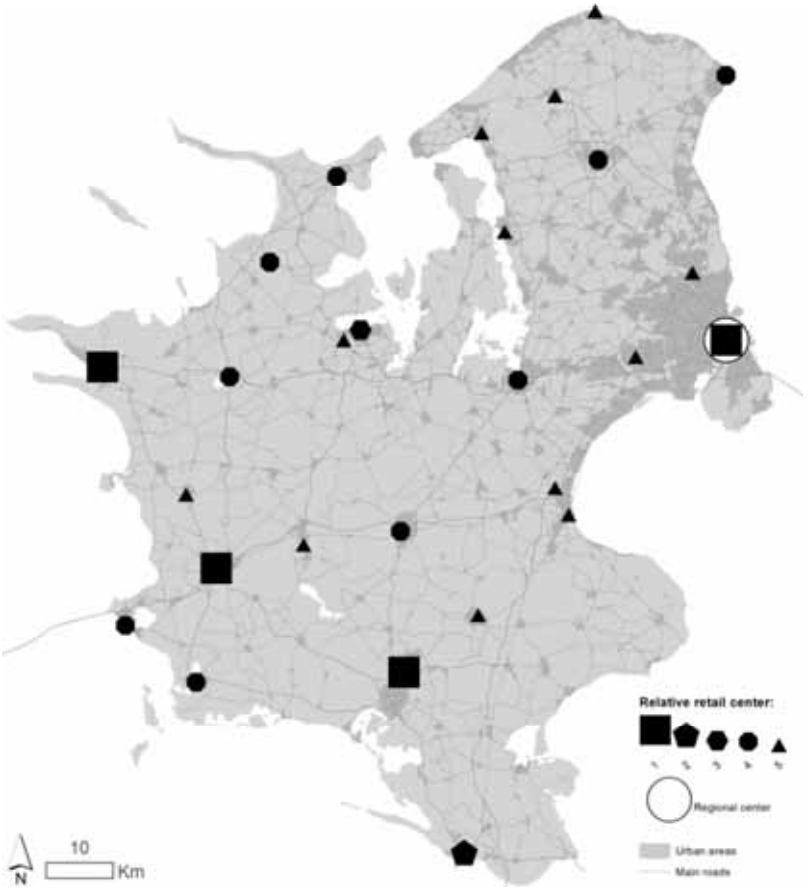
- Computer assisted telephone interviews of representative sample of 10-85 year olds
- One day of travel is registered
- Sample size is approx. 10000 persons/year
- Detailed account of travel by trip-stages, trips, and journeys; time, distance, mode, and purposes.
- Background data include household composition and vehicles; as well as socio-demographic variables, education, and income.
- Location references are available at the address and coordinate level: home, work, origins, and destinations.

Urban form and location measures

- Density
- Diversity
- Design
- Destination accessibility
- Distance to transit
- Demand management

(Ewing and Cervero 2011)

- Measured based on spatially explixit datasets and assigned to survey respondents by their home address.



Example – concepts of destinations/subcenters - for measurement of destination accessibility

Center level	Share of employment in subregion	Absolute employment	Share of retail employment in subregion	Absolute number of retail jobs
1	19%	50000	20%	1500
2	15%	20000	15%	950
3	10%	10000	10%	400
4	5%	5000	5%	100
5	2,5%	-	2,5%	-

Analysis

- Dependent variables: total travel; travel for work or education; and travel for non-work and non-education purposes (classification based on journey purposes)

- Sample selection modelling approach combining the probability of travelling with the distance travelled when travelling.

- Categorical variable based analysis of changes based on NTS 2006/7 and 2010/2011.

- Regression models with multiple control variables to analyse the relation between distance travelled and location/urban form, controlling for socio-demographic variables, property values & interactions with time. (optimal models as far as data allows)

Location correlates of travel distance*

		Any travel		Travel for work or education		Travel for non-work and non-education	
		Coef.	P>z	Coef.	P>z	Coef.	P>z
2006/07 & 2010/11	Population density (within 1,5 km)	-0,150	0,000	-0,110	0,000	-0,188	0,000
	Jobs/pop ratio (within 1,5 km)			-0,296	0,008		
	Dist. to subcenter (5)	0,047	0,021	0,067	0,017	-0,054	0,028
	Dist. to regional center	5,94E-06	0,003	9,11E-06	0,001		
	Dist to re. center (sq.)	-3,27E-11	0,064	-5,05E-11	0,039		
2010/11	Dist. to subcenter (3)	0,069	0,000	0,075	0,000		
	Dist to subcenter (5)					0,082	0,000

•Controlling for income, age, gender, driverslicence, employment, education, household type, and selection bias.

Changes in location dependency of travel

- Regional centrality; density and job surplus at the neigbourhood level – *no significant changes*.

- Significant changes in the role and effects of subregional centers /subcenters:
  - For travel to work or education a three level center hierarchy is in effect in 2010/11 (regional center; and two levels of subcenters)
  - For travel for nonwork and noneducation the role of subregional centers changes from induction by proximity into distance defined travel.

Other changes 2006/07 – 2010/11

- Cutting down on travel distances:
  - Women
  - Singles with children
  - Older people

- Stepping up in travel distances:
  - Unemployed
  - Driverslicense holders

Conclusions

- Behaviours have changed between 2006/07 and 2010/11 and this is reflected in the location dependency of travel.

- The importance of location in explaining travel distances has increased – based on subcenters.

- Effects seems plausibly explained by reduced activity levels, cautiousness, and cost reducing strategies on behalf of consumers. Attempts to save travel could lead to increased importance of nearest offers.

Perspectives – further work

- The current downturn may very well be replaced by a more ’normal’ increase in individual mobility/speed implying new developments in the location dependencies in urban regions.

- Studying the financial crisis can, however, say something about how an urban region absorbs such a chock and what role urban form and location play in adabting to the new circumstances.

- Studying different urban regions (urban systems) under different economic conditions (growth, shrinkage, unemployment, aging) could make a vaulable contribution to knowledge on sustainable or resilient urban form and location patterns.